

GUIDELINES

Students' independent work during preparation to practical lesson

Academic discipline	HUMAN ANATOMY
Topic	HEART

1. The relevance of the topic:

The study of the anatomical structure of the heart is necessary for the formation of clinical thinking in conditions of the differential diagnosis for the doctor of any specialty, but especially cardiologist and cardiac surgeon as cardiovascular diseases are one of the most widespread health disorders of the modern world.

2. Specific objectives

- to determine external structure of the heart.
- to determine large vessels, which are connected with chambers of the heart.
- to determine the internal structure of hearts chambers.
- to determine structural features of aortic valve, pulmonary valve, tricuspid and mitral valves.
- to determine layers comprising the wall of the heart.
- to determine layers comprising the wall of the heart in its different parts.
- to determine main parts of conducting system of the heart.
- to determine main sources of blood supply of the heart, be able to demonstrate coronary artery.
- to determine main ways of outflow of venous blood from the walls of the heart, be able to demonstrate the coronary sinus and its main tributaries, as well as the anterior cardiac vein.
- know about structural features of pericardium and be able to demonstrate its parts and sinuses.
- know and be able to demonstrate pulmonary and systemic blood circulation.

3. Basic level of knowledge

Anatomic axes and planes of the human body
Structure of the chest
Organs that located in area of the chest
Main elements of the vascular system

4. Task for independent work during preparation to practical classes.

4.1. A list of the main terms, parameters, characteristics that need to be learned by student during the preparation for the lesson.

Term	Definition
COR (CARDIA)	Hollow muscular organ located in the middle mediastinum, which pumps the blood into the arteries of pulmonary and systemic blood circulations and receives blood from the veins of this circulations.
BASIS CORDIS	Superior part of the heart, which is formed by the right and left atria.
APEX CORDIS	Inferior part of the heart, which is formed by ventricles
FACIES STERNOCOSTALIS; FACIES ANTERIOR	One of the four surfaces of the heart, which is the closest to ribs and sternum
FACIES DIAPHRAGMATICA; FACIES INFERIOR	One of the four surfaces of the heart, which is the closest to the diaphragm
FACIES PULMONALIS DEXTRA/SINISTRA	Two of the four surfaces of the heart, which are the closest to lungs
SULCUS INTERVENTRICULARIS ANTERIOR	Separates right and left ventricles on the front surface

SULCUS INTERVENTRICULARIS POSTERIOR	Separates right and left ventricles on the back surface
SULCUS CORONARIUS	Separate atria and ventricles
VENTRICULUS CORDIS DEXTER/SINISTER	Two of the four chambers of the heart, which pumps out blood into the aorta (from left ventricle) and pulmonary artery (from right ventricle).
ATRIUM CORDIS DEXTRUM/SINISTRUM	Two of the four chambers of the heart, which receive blood.
AURICULA ATRII	Parts of the right and left atrium.
SEPTUM INTERVENTRICULARE	Septum between right and left ventricles
SEPTUM INTERATRIALE	Septum between right and left atria
TRABECULAE CARNEAE	Elements of internal structure of left and right ventricles.
MM. PAPILLARES	Part of the myocardium in the cavities of both ventricles, which are covered with endocardium
CHORDAE TENDINEAE	Structures which connect parts of atrioventricular valves with mm. papillares or trabeculae carneae
FOSSA OVALIS	Located on septum interatriale nearly to the right atrium
MM. PECTINATI	Elements of internal structure in the cavities of both atria, which are situated in area of auricles.
OSTIUM SINUS CORONARII	The opening in the posterior wall of the right atrium
OSTIUM VENAE CAVAE INFERIORIS	The opening in the posterior wall of the right atrium
OSTIUM VENAE CAVAE SUPERIORIS	The opening in the posterior wall of the right atrium
OSTIUM ATRIOVENTRICULARE DEXTRUM	The hole between right ventricle and atrium
VALVA ATRIOVENTRICULARIS DEXTRA; VALVA TRICUSPIDALIS	Valve, which is situated between right ventricle and atrium
OSTIUM TRUNCI PULMONALIS	The opening between the right ventricle and the pulmonary trunk
VALVA TRUNCI PULMONALIS	Valve between the right ventricle and the pulmonary trunk
OSTIA VENARUM PULMONALIUM	The opening in the posterior wall of the left atrium
VALVULA FORAMINIS OVALIS	The formation on the interatrial septum from the side of the left atrium
OSTIUM ATRIOVENTRICULARE SINISTRUM	The hole between left ventricle and atrium
VALVA ATRIOVENTRICULARIS SINISTRA; VALVA MITRALIS	Valve, which is situated between left ventricle and atrium
OSTIUM AORTAE	The hole between right ventricle and aorta
VALVA AORTAE	Valve located in ostium aortae
ENDOCARDIUM	One of the layers comprising the wall of the heart
MYOCARDIUM	One of the layers comprising the wall of the heart
COMPLEXUS STIMULANS CORDIS; SYSTEMA CONDUCTENTE CORDIS	Structures of myocardium, which are responsible for generating and conducting of electrical impulse
NODUS SINUATRIALIS	Part of the conductive system of the heart
NODUS ATRIOVENTRICULARIS	Part of the conductive system of the heart
FASCICULUS ATRIOVENTRICULARIS	Part of the conductive system of the heart. The

	bundle of His
CRUS DEXTRAM	The right continuation of the bundle of His
CRUS SINISTRAM	The left continuation of the bundle of His
RR. SUBENDOCARDIALES	Tiny branches of the conductive system of the heart
PERICARDIUM	Fibro-serous bag that surrounds the heart and initial departments of large vessels associated with the heart
PERICARDIUM FIBROSUM	One of two parts of the pericardium
PERICARDIUM SEROSUM	One of two parts of the pericardium
TRUNCUS PULMONALIS	Starts from the right ventricle and carries blood from it.
AORTA	Starts from the left ventricle and carries blood from it.
ARTERIA CORONARIA DEXTRA	Main artery of the heart
R. INTERVENTRICULARIS POSTERIOR	Terminal branch of the right coronary artery
ARTERIA CORONARIA SINISTRA	Main artery of the heart
R. INTERVENTRICULARIS ANTERIOR	Terminal branch of the left coronary artery
R. CIRCUMFLEXUS	Terminal branch of the left coronary artery
SINUS CORONARIUS	The biggest vein of the heart
V. CARDIACA MAGNA; V. CORDIS MAGNA	One of the five main veins, which flow into the coronary sinus of the heart
V(V). VENTRICULI SINISTRI POSTERIOR(ES)	One of the five main veins, which flow into the coronary sinus of the heart
V. OBLIQUA ATRII SINISTRI	One of the five main veins, which flow into the coronary sinus of the heart
V. CARDIACA MEDIA; V. CORDIS MEDIA; V. INTERVENTRICULARIS POSTERIOR	One of the five main veins, which flow into the coronary sinus of the heart
V. CARDIACA PARVA; V. CORDIS PARVA	One of the five main veins, which flow into the coronary sinus of the heart

4.2. Theoretical questions for the lesson:

1. Describe and demonstrate external structure of the heart.
2. Name and show large vessels, which are connected with chambers of the heart.
3. Describe and demonstrate structural features of the internal surface of right atrium.
4. Describe and demonstrate structural features of the internal surface of right ventricle.
5. Describe and demonstrate structural features of the internal surface of left atrium.
6. Describe and demonstrate structural features of the internal surface of left ventricle.
7. Describe and demonstrate structure of interventricular septum and interatrial septum.
8. Describe and demonstrate structural features of aortic valve, pulmonary valve, tricuspid and mitral valves.
9. Describe and demonstrate layers comprising the wall of the heart.
10. Describe and demonstrate main parts of stimulant complex of the heart.
11. What are the main sources of blood supply to the heart? Demonstrate the coronary arteries and their terminal branches.
12. What are the main ways of outflow of venous blood from the walls of the heart? Demonstrate the coronary sinus and its main tributaries and some cardiac veins.
13. Describe and demonstrate structural features of the pericardium.
14. Describe and demonstrate sinuses of pericardium.
15. Describe pulmonary and systemic circulation.

4.3. The list of practical skills

- Base of the heart
- Apex of the heart
- Four hearts surfaces

- Coronary sulcus
- Anterior interventricular sulcus
- Posterior interventricular sulcus
- Aorta
- Superior vena cava
- Inferior vena cava
- Pulmonary trunk
 - Pulmonary arteries

Right atrium

- Right auricle
- Pectinate muscles
- Ostium superior vena cava
- Ostium inferior vena cava
- Ostium coronary sinus

Left atrium

- Left auricle
- Pectinate muscles
- Ostium pulmonary veins

Interatrial septum

Right ventricle

- tricuspid valve
 - anterior cuspid
 - posterior cuspid
 - septal cuspid
- pulmonary trunk valve
- anterior and posterior papillary muscle
- chordae tendineae
- trabeculae carnae

Left ventricle

- mitral valve
 - anterior cuspid
 - posterior cuspid
- vestibule of the aorta
- valve of aorta
- anterior and posterior papillary muscle
- chordae tendineae
- trabeculae carnae

Interventricular septum

Endocardium

Myocardium

Pericardium

5. Sources:

Anatomy nomenclature international	http://anatom.ua/anatomical-terminology/
LECTURE	https://anatom.ua/basis/english/lectures/
Textbook 'Human anatomy'	PP. 292-301 http://anatom.ua/basis/english/online-book-in-english/
Work Book (Coloring book)	PP. 103-104
Atlas of human anatomy (Sobotta)	PP. 104, 112-114, 125-129
QUIZES	https://anatom.ua/basis/english/tests/
VIDEO	https://anatom.ua/basis/video/

6. Materials for self-control:

1. Increased blood pressure in the aorta caused a strain on the heart muscle. The muscular wall of which part of the heart will respond to stimulation?

- A. right ventricle.
- B. left atrium.
- C. left ventricle.
- D. right atrium.
- E. sinus coronary veins.

2. Increased blood pressure in the pulmonary trunk caused a strain on the heart muscle. The muscular wall of which part of the heart will respond to stimulation?

- A. right ventricle.
- B. left atrium.
- C. left ventricle.
- D. right atrium.
- E. sinus coronary veins.

3. In hypertension the left heart border can be shifted to the left. Because of which chambers of the heart or blood vessels does this shift occur?

- A. left atrium.
- B. left ventricle.
- C. left ventricle and left atrium.
- D. arcus aortae.
- E. pulmonary trunk.

4. The patient has poor blood flow of blood in veins that are branches of the vein located in the interventricular sulcus of heart. What is the name of the vein of the interventricular sulcus of heart?

- A. V. obliqua atrii sinistri.
- B. V. cordis media.
- C. V. cordis parva.
- D. V. posterior ventriculi sinistri.
- E. V. cordis magna.

5. The patient has anterosuperior infarction of the heart as the result of the thrombosis of the artery. Which artery?

- A. anterior interventricular branch of left coronary artery.
- B. posterior interventricular branch of right coronary artery.
- C. circumflex branch of left coronary artery.
- D. pulmonary artery.
- E. posterior artery of left ventricle.

6. A patient has infarction of posterior part of interventricular septum. Which artery has a blood flow disorder?

- A. R. atrialis intermedius.
- B. R. marginalis dexter.
- C. R. interventricularis posterior.
- D. R. circumflexus.

E. R. marginalis sinister.

7. A 50-year-old patient was hospitalized with complaints of chest pain and breathlessness. After angiography, the pathological changes in the posterior interventricular branch of the right coronary artery were revealed. What area of the heart was affected?

- A. right atrium.
- B. left atrium.
- C. anterior wall of right and left atria.
- D. posterior wall of right and left atria.
- E. tricuspid valve.

8. During the examination of a teenager a doctor detected a congenital heart defect – functioning of Patent ductus arteriosus (PDA). What structures are connected by this duct during intrauterine development?

- A. pulmonary trunk and aorta.
- B. left and right ventricles.
- C. aorta and inferior vena cava.
- D. left and right atrium.
- E. pulmonary trunk and superior vena cava.

9. During ultrasound investigation it was revealed that the thickness of the left ventricular wall is 23 mm. Is that normal? If not, what is the normal thickness of the left ventricle wall?

- A. yes. The normal thickness is 20-30 mm.
- B. yes. The normal thickness is 10-30 mm.
- C. no. The normal thickness is 10-15 mm.
- D. no. The normal thickness is 3-5 mm.
- E. no. The normal thickness is 5-8 mm.

10. The patient is diagnosed with inflammation of the endocardium (endocarditis). What structure of the heart is affected in this case?

- A. conductive system of the heart.
- B. hearts valves.
- C. coronary vessels.
- D. pericardium.
- E. myocardium.

11. Choose the vessels that fall into the left atrium (atrium sinistrum).

- A. v. cavae
- B. v. pulmonales
- C. v. jugularis interna
- D. truncus pulmonalis
- E. aorta

12. Do aa. coronariae form anastomoses?

- A. always
- B. never
- C. sometimes form
- D. sometimes do not form

E. form anastomosis in the case of anomalies of development

13. Where do vv. cordis anteriores of the heart fall into?

- A. ventriculus sinister
- B. atrium sinistrum
- C. atrium dextrum
- D. ventriculus dexter
- E. aorta ascendens

14. What kind of blood does flow inside of v. pulmonales?

- A. arterial
- B. venous
- C. mixed
- D. in v. pulmonalis sinister – only arterial
- E. in v. pulmonalis dexter – only arterial

15. What arteries do provide blood supply of the heart?

- A. aa. subclaviae
- B. aa. carotis communes
- C. aa. coronariae
- D. aortae abdominalis
- E. aa. pulmonales

16. Which of the v. cordis does pass in the sulcus interventricularis posterior?

- A. v. cordis magna
- B. v. cordis parva
- C. v. ventriculi sinistri posterioris
- D. v. cordis media
- E. v. cava superior

17. What is in the pericardium space?

- A. arterial blood
- B. lymph
- C. venous blood
- D. serous fluid
- E. water

18. Where does sinus coronarius cordis enter?

- A. ventriculus sinister
- B. atrium sinistrum
- C. ventriculus dexter
- D. atrium dextrum
- E. v. cava superior

19. What heart chambers do receive veins?

- A. atrium dextrum et atrium sinister
- B. atrium dextrum et ventriculus sinister
- C. ventriculus dexter et sinister

- D. atrium sinister et ventriculus dexter
- E. conus arteriosus

20. Choose sinuses of the pericardium.

- A. sinus transversus et rectus
- B. sinus cavernosus et sigmoideus
- C. sinus occipitalis et rectus
- D. sinus transversus et obliquus
- E. sinus transversus et occipitalis

21. What veins do collect blood from the walls of the left ventricle?

- A. v. cordis magna, v. posterior ventriculi sinister
- B. v. cordis anterior, v. cordis parva, v. obliqua atrii sinistri
- C. v. cordis minimae, v. cordis parva
- D. v. cordis anteriores, v. cordis magna
- E. v. cordis media, vv. obliqua atrii sinistri

22. What are the parts of circulatory system?

- A. arterial, lymphatic, biliary
- B. blood and lymphatic
- C. venous, lymphatic, urinary
- D. arterial, urinary
- E. central and peripheral

23. Choose blood vessels that fall into the atrium dextrum.

- A. v. jugularis interna
- B. vv. pulmonales, sinus coronaries
- C. v. cava superior et inferior, sinus coronarius
- D. v. jugularis anterior et externa
- E. v. cava inferior et v. azygos

24. Which valve is located behind the left sternum margin and at the level of third intercostal space?

- A. valva trunci pulmonalis
- B. valva atrioventricularis dextra
- C. valva atrioventricularis sinistra
- D. valva aortae
- E. valva v. cavae inferioris

25. What parts do represent conductive system of the heart?

- A. nodes, nerve trunks
- B. nodes, bundle of His, crura of bundle of His, the Purkinje fibres
- C. the atrioventricular bundles, bundle of His, bundle branches, cardiac vessels
- D. muscles fibres, nodes, bundle branches
- E. the atrioventricular bundles, bundle branches, nerve trunks

26. What sulci are in the heart?

- A. anterior et posterior

- B. sulci interventriculares et coronarius
- C. superior et inferior
- D. apicales
- E. medialis et lateralis

27. How many cusps does right atrioventricular valve has?

- A. 2
- B. 3
- C. 4
- D. 1
- E. 5

28. Where is the sinoatrial node of systema conducens cordis located?

- A. atrium dextrum
- B. ventriculus dexter
- C. atrium sinistrum
- D. ventriculus sinister
- E. arcus aortae

29. Where is the right heart border located?

- A. 2-3 cm to the right of the right edge of the sternum
- B. on the right edge of the sternum
- C. 1-2 cm to the right of the right edge of the sternum
- D. 4 cm to the right of the right edge of the sternum
- E. 1 cm to the left of the right edge of the sternum

30. What layers are in the heart?

- A. externus, medius, mucosus
- B. intima, media et adventitia
- C. epicardium, myocardium, endocardium
- D. mucosa, muscularis, serosa
- E. epicardium, myocardium, pericardium

31. Which valve is located behind the third left costal cartilage and sternal junction?

- A. valva trunci pulmonalis
- B. valva atrioventricularis dextra
- C. valva atrioventricularis sinistra
- D. valva aortae
- E. valva v. cavae inferioris

32. What are the crura of the fasciculus atrioventricularis?

- A. crus superior et inferior
- B. crus anterior et posterior
- C. crus dextrum et sinistrum
- D. crus lateralis et medialis
- E. crus posterior et sinistrum

33. Where is the upper heart border located?

- A. lower edge of the second costal cartilage
- B. at the level of second rib
- C. at the level of fourth rib
- D. upper edge of the third costal cartilage
- E. upper edge of the fourth costal cartilage

34. What sulci are in the heart?

- A. anterior et posterior
- B. sulci interventriculares et coronarius
- C. superior et inferior
- D. apicalis
- E. medialis et lateralis

35. Which nodes are parts of systema conducens cordis?

- A. nodus sinuatrialis et atrioventricularis
- B. atrioventricularis et ventricularis
- C. sinuatrialis et atrialis
- D. atrioventricularis et preaortalis
- E. sinuatrialis et ganglion thoracicum superior

36. What groove does mark the boundary between the atria and ventricles

- A. anterior interventricular sulcus
- B. posterior interventricular sulcus
- C. coronary sulcus
- D. chordae tendineae
- E. trabeculae carneae

37. What groove does mark the anterior position of the interventricular septum between the two ventricles?

- A. anterior interventricular sulcus
- B. posterior interventricular sulcus
- C. coronary sulcus
- D. chordae tendineae
- E. trabeculae carneae

38. What groove does separate two ventricles on the heart's inferior surface?

- A. anterior interventricular sulcus
- B. posterior interventricular sulcus
- C. coronary sulcus
- D. chordae tendineae
- E. trabeculae carneae

39. What heart chamber forms the entire right border of the human heart?

- A. right atrium
- B. right ventricle
- C. left atrium
- D. left ventricle
- E. coronary sulcus

40. What heart chamber forms most of the anterior surface of the human heart?

- A. right atrium
- B. right ventricle
- C. left atrium
- D. left ventricle
- E. coronary sulcus

41. What heart chamber forms most of the posterior surface of the human heart?

- A. right atrium
- B. right ventricle
- C. left atrium
- D. left ventricle
- E. coronary sulcus

42. What heart chamber form the apex of the human heart?

- A. right atrium
- B. right ventricle
- C. left atrium
- D. left ventricle
- E. coronary sulcus

ANSWERS:

1	C	28	A
2	A	29	A
3	B	30	C
4	E	31	A
5	A	32	C
6	C	33	D
7	D	34	B
8	A	35	A
9	C	36	C
10	B	37	A
11	B	38	B
12	A	39	A
13	C	40	B
14	A	41	C
15	C	42	D
16	D		
17	D		
18	D		
19	A		
20	D		
21	A		
22	B		
23	C		
24	D		
25	B		
26	B		
27	B		